Geospatial Sciences for Sustainable Development in Africa:
Global Dialogue on Emerging Science and Technology (GDEST) 2008

Cape Town, South Africa, 17-19 March 2008
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The Cape Town meeting

A meeting focusing on Geospatial Sciences for Sustainable Development was held in Cape Town, South Africa, from 17-19 March 2008, as part of the Global Dialogues on Emerging Science and Technology (GDEST) program[1]. The aim of the meeting was to re-invigorate collaboration between scientists based in Africa and the United States by identifying key, high potential areas for engagement and discussing concrete steps to realize the potential of geospatial science in shaping decision-making. This dialogue was firmly based on a shared understanding of the success factors, as well as the constraints, in employing geospatial technologies in Africa today.

Bringing together close to 100 participants from 15 countries, the meeting comprised a series of presentations and panel discussions, as well as an exhibition of data and information products, technology and posters. Given the number of papers submitted, the meeting was structured into parallel presentation sessions focusing on access to sustainable and timely sources of data, as well as the trends in applications of geo-information science and how these interface with and influence the decision- and policy-making arena. In addition, the program was structured to provide time for informal networking and social interaction.

Status of the application of geo-information to sustainable development in Africa

Contributed papers largely fell into three categories, namely those that presented theoretical development in a particular application of geo-information science, those that primarily focused on the current status of geo-information usage and technology within countries, and those that dealt at a more abstract level with the policy environment or institutional and organizational challenges and opportunities facing the application of geospatial technologies in Africa towards sustainable development.

The picture which emerged is one in which there has been significant progress in terms of the number and reach of applications of geospatial technologies within Africa, even over the past five years. Many presentations demonstrated how geospatial technologies are being used not only to produce thematic maps but also to provide information in a form that can readily be used to guide decision-making.

[1] Organized under the auspices of the Science Advisor to the Secretary of State of the United States of America, and co-sponsored by the US Department of State, Office of the Geographer and Global Issues, and the Division of Geomatics, University of Cape Town

However, despite the growth in the use of geo-information, there are factors which constrain the optimal utilization of geo-information and associated technologies. The foremost of these are the lack of co-ordination amongst data producers and users, together with a lack of resources at the disposal of those capable of employing and applying geo-information technologies. This means that existing ability and knowledge is not fully tapped. In other words, while there is capability, capacity is limited. There was also considerable discussion of the limitation placed by data itself, which crystallized into identifying the crux of the matter as being the *availability* of data fit-for-purpose to potential users, as opposed to the somewhat more abstract issue of the existence of the data. Some data, while known to exist, remain unavailable to other users. The resolution of remotely sensed imagery available determines its applicability, and with growing awareness of the critical role of local government in service delivery, the need for large scale mapping and high resolution imagery is also becoming more pressing. Geo-referenced socio-economic and demography data are perceived to be lacking. Another theme which emerged through presentations and discussions was inadequate communication with stakeholders outside the traditional geo-information community about the possibilities of geo-information technologies and the results of geospatial analysis.

The vision for employing geospatial sciences for sustainable development in Africa

Conference participants were eager to see a scenario in which all the ingredients enabling the harnessing of geospatial information to address the challenges of sustainable development in Africa are in place. The crucial element for achieving this vision is that of a sustainable, critical mass of African expertise, undergirded by the infrastructure and equipped with the appropriate tools required to utilize fully geospatial information. Data fit-for-purpose needs to be available to these African experts, i.e. low, medium and high resolution remotely sensed imagery as is appropriate for a particular application, as well as socio-economic and demographic information, clearly key to making valuable inputs to decisions relating to sustainable development.

An important aspect of this picture is the ability to convey both to influential decision-makers, and 'the-person-in-the-street' (or rather, 'the-person-engaged-in-subsistence-agriculture-for-a-livelihood') the benefit deriving from the use of geo-information technology. This means that first of all the communication skills of the geo-information community needs to be enhanced. Secondly, a consciousness needs to be developed about measuring – and recording - outcomes of projects. Reflecting on, assessing and articulating the impact of the application of geo-information and geospatial tools on an ongoing basis is an important benefit that is too often ignored.

How do we achieve the vision?

Based on the information shared and discussions during the conference, the meeting participants agreed on several principles which should guide actions and interventions towards achieving the vision of sustainable development in Africa supported by utilizing geospatial information. Concrete activities and projects were also proposed.

Guiding principles:

- Foremost is the principle that we should take cognizance of what exists, and what has been achieved in the past, and build from there. These include endeavors at the national, sub-regional (i.e. regions within African), regional (pan African) and global (e.g. Group on Earth Observations (GEO), Global Spatial Data Infrastructure (GSDI)) scales. To start new initiatives ignoring what has gone before or what is in place, albeit weak or imperfect, will dilute the impact of both new and older initiatives, and is not the way to achieve critical mass, which requires a coordinated approach.
- Project plans should at the outset provide for the preservation and, if applicable, maintenance, of the data and information deriving from the envisaged activities.
- In addition, the design of interventions or projects should explicitly take the needs of African countries and communities into account. For instance, local sensitivity might dictate that there be reporting back to communities involved in the study, and cognizance should be taken of the role of consensus-in decision making.
- Initiatives should be framed by a clear understanding of the needs of the users (and potential users) of the information being derived and systems being developed.
- Capacitating local government and communities is important for sustainable development
- Universities are the appropriate vehicles for human capacity development within collaborative programmes

Recommended actions and programmes:

1. The following fora over the next two years were identified for continuing dialogue, information sharing, reviewing of progress and bringing other partners into discussion and collaborative initiatives:
    a. The Association of American Geographers (AAG) meeting, to be held in Boston, USA, in April 2008;
    b. The Environmental Systems Research Institute, Inc (ESRI) User conference, to be held in San Diego, USA, in August 2008;
    c. The next biennial African Association of Remote Sensing for the Environment (AARSE) meeting, AARSE ’08, to be held in Accra, Ghana in October 2008;
    d. International Geoscience and Remote Sensing Symposium (IGARSS) ’09, to be held in Cape Town, South Africa, in July 2009;

    e. The next conference in the biennial AfricaGIS conference series, AfricaGIS ’09, to be held in Kampala, Uganda, in October/November 2009.
2. Opportunities should be sought and realized to fund face-to-face networking at national, sub-regional and regional levels for the sharing of information and experience, to facilitate co-operation and co-ordination, through linking networking opportunities to training interventions.
3. As training is required in furthering the communication skills of the geographic information community in Africa, opportunities should be pursued to incorporate such training in meeting and other training programmes. For example, a keynote address will be incorporated in the AfricaGIS ’09 programme to focus on how the use of geo-information can be communicated to decision-makers.
4. Projects and programmes should be designed, which recognise and build on African human capital, ranging from African expertise including that associated with the African Diaspora, and that resident in communities in terms of indigenous knowledge.
5. Projects should be designed to utilise African *networks of excellence* (AARSE, African Geo-information Research Network (AGIRN), Environmental Information Systems Africa (EIS-AFRICA), University networks, e.g. University Network for Disaster Risk Reduction in Africa (UNEDRA), thereby strengthening these professional networks.
6. Existing *platforms* for dialogue, information sharing and communication, such as the AARSE and AfricaGIS conferences, should be utilised to effect the communication and consultation work stream of projects.
7. Existing collaborative African *projects* should be supported:
    a. Collaborative partnership should be defined towards instrument calibration for the development of the African Resource Management (ARM) satellite constellation;
    b. Funding should be sought to realise elements of the Mapping Africa for Africa programme, and in particular, to implement the third phase of the project which addresses digital data at the sub-national level and scale;
    c. Funding should be sought to assist countries to contribute to and implement African Reference Frame (AFREF).
8. An inventory of geo-information initiatives should be compiled and maintained, and a custodian should be found to provide access to the inventory. This would also support the development of a portfolio of case studies involving both successful and less successful projects. Funding should be sought for these initiatives.
9. The lack of available geo-referenced African demographic and socio-economic needs to be addressed through an assessment of what information exists, and the challenges to these data becoming widely available. Funding should be sought for this project (‘Measuring Africa for Africa’). The project would serve to identify and frame future interventions (e.g. geospatial capacity building within national statistics organisations, policy formulation and implementation, the establishment of technological infrastructure) needed to affect the availability of these socio-economic and demographic data.

10. Sustainable mechanisms should be developed to facilitate the supply of high resolution remotely sensed data to African mapping agencies and other organisations in need of these data.
11. Regional centres which currently serve as points of capacity building in partnership with universities and provide data and data-related services (e.g. Regional Centre for Mapping of Resources for Development (RCMRD) and Regional Center for Training in Aerospace Surveys (RECTAS)) should be strengthened.
12. AARSE's ongoing initiative to establish the African Journal of Geo-information Science should be supported.
13. African universities should be strengthened with respect to their ability to build and sustain African capacity in the geospatial sciences, through the following:
    a. Funding should be made available for the infrastructure required to enable universities to provide in-country training;
    b. University teachers should be assisted to obtain higher degrees;
    c. Collaboration is required between US and Africa scientists on curriculum development and modernisation;
    d. Opportunities must be created for sandwich programmes for graduate students and mid-career professionals.

Immediate follow up from the Cape Town meeting:

The papers presented at the Cape Town meeting are to be collated and distributed as-is to meeting participants. Mentors will be provided to partner younger professionals should they so wish, in order to assist them in publishing the papers presented. A review paper will be compiled with the intention of publishing this in an African journal.

Concluding remarks

Based on the presentations and sharing of information facilitated through the Cape Town meeting, it is clear that progress that has been made in the development and application of geo-information in Africa over the past decade. Nevertheless, there are challenges to be overcome in further harnessing geo-information for sustainable development in Africa. What also emerged from the meeting is that there are specific collaborative interventions that could mitigate these challenges, and the simplest of all of these is the sharing of information amongst geo-information scientists. Thus the meeting participants–whose views are no doubt representative of many other scientists in both the USA and Africa–would clearly look forward to continued dialogue and opportunities to monitor and reflect on progress in ever more effective use of geospatial information in addressing the challenges of sustainable development in Africa.

Abbreviations

AAG	American Association of Geographers
AARSE	African Association of Remote Sensing for the Environment
AFREF	African Reference Frame
AGIRN	African Geo-information Research Network
ARM	African Resource Management
EIS-AFRICA	Environmental Information Systems Africa
ESRI	Environmental Systems Research Institute, Inc
GEO	Group on Earth Observations
GSDI	Global Spatial Data Infrastructure
IGARSS	International Geoscience and Remote Sensing Symposium
RCMRD	Regional Centre for Mapping of Resources for Development
RECTAS	Regional Center for Training in Aerospace Surveys
UNEDRA	University Network for Disaster Risk Reduction in Africa